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What is claimed is :

1. A monolithically integrated semiconductor device comprising :
a hetero-junction bipolar transistor having at least an electrode
5 contact layer which contacts directly with at least one of collector, base and
emitter electrodes ; and
at least a passive device having at least a passive device electrode
and at least a resistive layer,
wherein said electrode contact layer and said resistive layer
10 comprise the same compound semiconductor layer.
2. The device as claimed in claim 1, wherein said passive device
electrode and one of said collector, base and emitter electrodes comprises
the same metal layer.
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3. The device as claimed in claim 1, wherein said at least passive
device further comprises :
a resistive element which comprises : at least a resistive element
layer ; and at least a resistive element electrode ; and
20 a metal-insulator-metal capacitor which comprises : a bottom
electrode ; a capacitive dielectric layer ; and a top electrode.
4. The device as claimed in claim 3, wherein said at least electrode
contact layer comprises a base electrode contact layer which contacts

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directly with said base electrode.

5. The device as claimed in claim 4, wherein said base electrode contact layer, said resistive element layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

6. The device as claimed in claim 5, wherein said base electrode and said bottom electrode comprise the same metal layer.

10 7. The device as claimed in claim 5, wherein said base electrode and said top electrode comprise the same metal layer.

8. The device as claimed in claim 5, wherein said base electrode and said resistive element electrodes comprise the same metal layer.

15 9. The device as claimed in claim 3, wherein said at least electrode contact layer comprises a collector electrode contact layer which contacts directly with said collector electrode.

20 10. The device as claimed in claim 9, wherein said collector electrode contact layer, said resistive element layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

11. The device as claimed in claim 10, wherein said collector

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electrode and said bottom electrode comprise the same metal layer.

12. The device as claimed in claim 10, wherein said collector electrode and said top electrode comprise the same metal layer.

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13. The device as claimed in claim 10, wherein said collector electrode and said resistive element electrodes comprise the same metal layer.

10 14. The device as claimed in claim 3, wherein said at least electrode contact layer comprises an emitter electrode contact layer which contacts directly with said emitter electrode.

15 15. The device as claimed in claim 14, wherein said emitter electrode contact layer, said resistive element layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

16. The device as claimed in claim 15, wherein said emitter electrode and said bottom electrode comprise the same metal layer.

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17. The device as claimed in claim 15, wherein said emitter electrode and said top electrode comprise the same metal layer.

18. The device as claimed in claim 15, wherein said emitter electrode

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and said resistive element electrodes comprise the same metal layer.

19. The device as claimed in claim 1, wherein said at least passive device further comprises :

5 a resistive element which comprises : at least a resistive element layer ; and at least a resistive element electrode.

20. The device as claimed in claim 19, wherein said at least electrode contact layer comprises a base electrode contact layer which 10 contacts directly with said base electrode.

21. The device as claimed in claim 20, wherein said base electrode contact layer and said resistive element layer comprise the same compound semiconductor layer.

15 22. The device as claimed in claim 21, wherein said base electrode and said resistive element electrodes comprise the same metal layer.

23. The device as claimed in claim 19, wherein said at least 20 electrode contact layer comprises a collector electrode contact layer which contacts directly with said collector electrode.

24. The device as claimed in claim 23, wherein said collector electrode contact layer and said resistive element layer comprise the same

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compound semiconductor layer.

25. The device as claimed in claim 24, wherein said collector electrode and said resistive element electrodes comprise the same metal 5 layer.

26. The device as claimed in claim 19, wherein said at least electrode contact layer comprises an emitter electrode contact layer which contacts directly with said emitter electrode.

10 27. The device as claimed in claim 26, wherein said emitter electrode contact layer and said resistive element layer comprise the same compound semiconductor layer.

15 28. The device as claimed in claim 27, wherein said emitter electrode and said resistive element electrodes comprise the same metal layer.

29. The device as claimed in claim 1, wherein said at least passive device further comprises :

20 a metal-insulator-metal capacitor which comprises : a bottom electrode ; a capacitive dielectric layer ; and a top electrode.

30. The device as claimed in claim 29, wherein said at least electrode contact layer comprises a base electrode contact layer which

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contacts directly with said base electrode.

31. The device as claimed in claim 30, wherein said base electrode contact layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

32. The device as claimed in claim 31, wherein said base electrode and said bottom electrode comprise the same metal layer.

10 33. The device as claimed in claim 31, wherein said base electrode and said top electrode comprise the same metal layer.

15 34. The device as claimed in claim 29, wherein said at least electrode contact layer comprises a collector electrode contact layer which contacts directly with said collector electrode.

20 35. The device as claimed in claim 34, wherein said collector electrode contact layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

36. The device as claimed in claim 35, wherein said collector electrode and said bottom electrode comprise the same metal layer.

37. The device as claimed in claim 35, wherein said collector

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electrode and said top electrode comprise the same metal layer.

38. The device as claimed in claim 29, wherein said at least electrode contact layer comprises an emitter electrode contact layer which contacts 5 directly with said emitter electrode.

39. The device as claimed in claim 38, wherein said emitter electrode contact layer and said capacitive dielectric layer comprise the same compound semiconductor layer.

10 40. The device as claimed in claim 39, wherein said emitter electrode and said bottom electrode comprise the same metal layer.

15 41. The device as claimed in claim 39, wherein said emitter electrode and said top electrode comprise the same metal layer.

20 42. A monolithically integrated semiconductor device comprising :
a hetero-junction bipolar transistor having at least an electrode contact layer which contacts directly with at least one of collector, base and emitter electrodes ; and

at least a passive device having at least a passive device electrode and at least a resistive layer,

wherein said passive device electrode and one of said collector, base and emitter electrodes comprises the same metal layer.

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43. The device as claimed in claim 42, wherein said electrode contact layer and said resistive layer comprise the same compound semiconductor layer.

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44. The device as claimed in claim 43, wherein said at least passive device further comprises :

a resistive element which comprises : at least a resistive element layer ; and at least a resistive element electrode ; and

10 a metal-insulator-metal capacitor which comprises : a bottom electrode ; a capacitive dielectric layer ; and a top electrode.

45. The device as claimed in claim 43, wherein said at least passive device further comprises :

15 a resistive element which comprises : at least a resistive element layer ; and at least a resistive element electrode.

46. The device as claimed in claim 43, wherein said at least passive device further comprises :

20 a metal-insulator-metal capacitor which comprises : a bottom electrode ; a capacitive dielectric layer ; and a top electrode.

47. A monolithically integrated semiconductor device comprising :
a hetero-junction bipolar transistor having at least an electrode

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contact layer which contacts directly with at least one of collector, base and emitter electrodes ;

a resistive element which comprises : at least a resistive element layer ; and at least a resistive element electrode ; and

5 a metal-insulator-metal capacitor which comprises : a bottom electrode ; a capacitive dielectric layer ; and a top electrode,

wherein said electrode contact layer, said resistive element layer and said capacitive dielectric layer comprise the same compound semiconductor layer, and

10 wherein said resistive element electrode, said top electrode and said at least one of collector, base and emitter electrodes comprises the same metal layer.

48. A method of forming a monolithically integrated semiconductor device comprising : a hetero-junction bipolar transistor having at least an electrode contact layer which contacts directly with at least one of collector, base and emitter electrodes ; and at least a passive device having at least a passive device electrode and at least a resistive layer,

15 wherein said electrode contact layer and said resistive layer are formed concurrently in the same processes.

49. The device as claimed in claim 48, wherein said passive device electrode and one of said collector, base and emitter electrodes are formed concurrently in the same processes.

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50. A method of forming a monolithically integrated semiconductor device comprising : a hetero-junction bipolar transistor having at least an electrode contact layer which contacts directly with at least one of collector,

5 base and emitter electrodes ; and at least a passive device having at least a passive device electrode and at least a resistive layer,

wherein said passive device electrode and one of said collector, base and emitter electrodes are formed concurrently in the same processes.

10 51. The device as claimed in claim 50, wherein said electrode contact layer and said resistive layer are formed concurrently in the same processes.

15 52. A monolithically integrated semiconductor device comprising : a hetero-junction bipolar transistor having at least an electrode contact layer which contacts directly with at least one of collector, base and emitter electrodes ; a resistive element which comprises : at least a resistive element layer ; and at least a resistive element electrode ; and a metal-insulator-metal capacitor which comprises : a bottom electrode ; a capacitive dielectric layer ; and a top electrode,

20 wherein said electrode contact layer, said resistive element layer and said capacitive dielectric layer are formed concurrently in the same processes, and

wherein said resistive element electrode, said top electrode and

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said at least one of collector, base and emitter electrodes are formed concurrently in the same processes.

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